

Amendments To The Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-18. (Canceled)

Claim 19. (Previously Presented) A process for producing a resin encapsulated semiconductor device comprising a semiconductor device and a cured product of a flame retardant epoxy resin composition, comprising the steps of:

molding on said semiconductor device a flame retardant epoxy resin composition comprising (A) a halogen-free epoxy resin with at least 2 epoxy groups within each molecule, (B) a curing agent having at least two phenolic hydroxyl groups within the curing molecule, and (C) a foaming agent which decomposes at a temperature of at least 180° C; and

curing the molded composition to form said cured product to encapsulate the semiconductor device within the cured product, wherein:

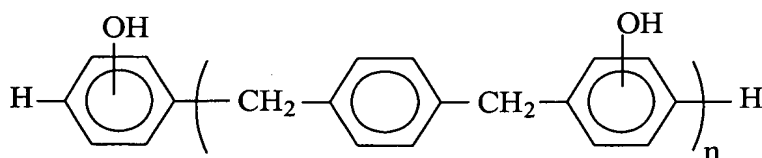
- (i) the quantity of gas that is generated from said foaming agent (C) is at least 40 ml/g,
- (ii) said curing agent (B) is present in a quantity which produces a ratio of the hydroxyl group equivalence of component (B) relative to the epoxy equivalence of the epoxy resin of component (A) which falls within the range of approximately 0.5 to 2.0,
- (iii) said foaming agent (C) is present in a quantity ranging from 0.01 to 50 % by weight based on the whole composition, and

the temperature for molding and curing the composition is lower than the decomposition temperature of said foaming agent (C).

Claim 20. (Previously Presented) The process according to claim 19, wherein the epoxy resin of the component (A) comprises a bisphenol A type epoxy resin, a bisphenol F type epoxy resin, a bisphenol S type epoxy resin, a phenol novolak type epoxy resin, a cresol novolak type epoxy resin, a naphthalene type epoxy resin, a biphenyl type epoxy resin, an N-glycidyl compound derived from an aromatic amine and a heterocyclic nitrogen base, or a combination of two or more thereof.

Claim 21. (Canceled)

Claim 22. (Previously Presented) The composition according to claim 19, wherein the curing agent (B) comprises a phenol aralkyl resin having a structure represented by the formula:



wherein n is a number that provides a hydroxyl group equivalence of 175 g/eq.

Claim 23. (Canceled)

Claim 24. (Currently Amended) The process according to claim 19, wherein said compound with at least two phenolic hydroxyl groups is a novolak type phenol resin, a resol type phenol resin, a ~~polyoxystyrenes~~ polyoxystyrene, a phenol aralkyl resin, or a combination of two or more.

Claim 25. (Canceled)

Claim 26. (Previously Presented) The process according to claim 19, wherein the foaming agent (C) decomposes at a temperature of at least 200° C.

Claim 27. (Previously Presented) The process according to claim 26, wherein the foaming agent (C) decomposes at a temperature of at least 250° C.

Claim 28. (Canceled)

Claim 29. (Previously Presented) The process according to claim 19, wherein a quantity of gas that is generated from said foaming agent (C) is at least 80 ml/g.

Claim 30. (Previously Presented) The process according to claim 29, wherein a quantity of gas that is generated from said foaming agent (C) is at least 150 ml/g.

Claim 31. (Canceled)

Claim 32. (Previously Presented) The process according to claim 19, wherein said foaming agent (C) comprises azodicarbonamide, azobistetrazole diaminoguanidine, azobistetrazole guanidine, 5-phenyltetrazole, bistetrazole guanidine, bistetrazole piperazine, bistetrazole diammonium, N,N'-dinitrosopentamethylene tetramine, hydrazodicarbonamide, or a combination of two or more thereof.

Claims 33 and 34. (Canceled)

Claim 35. (Previously Presented) The process according to claim 19, further comprising (D) a filler.

Claim 36. (Previously Presented) A process for producing a resin encapsulated semiconductor device comprising a semiconductor device and a cured product of a semiconductor encapsulating material, comprising the steps of:

molding on said semiconductor device a semiconductor encapsulating material comprising a composition comprising (A) a halogen-free epoxy resin with at least 2 epoxy groups within each molecule, (B) a curing agent having at least two phenolic hydroxyl groups within the curing molecule, and (C) a foaming agent which decomposes at a temperature of at least 180° C; and

curing the molded composition to form said cured product to encapsulate the semiconductor device within the cured product, wherein:

(i) the quantity of gas that is generated from said foaming agent (C) is at least 40 ml/g,

(ii) said curing agent (B) is present in a quantity which produces a ratio of the hydroxyl group equivalence of component (B) relative to the epoxy equivalence of the epoxy resin of component (A) which falls within the range of approximately 0.5 to 2.0,

(iii) said foaming agent (C) is present in a quantity ranging from 0.01 to 50 % by weight based on the whole composition, and

the temperature for molding and curing the composition is lower than the decomposition temperature of said foaming agent (C).

Claim 37. (Previously Presented) A resin encapsulated semiconductor device produced by the process according to claim 19 encapsulating said semiconductor device.

Claim 38. (Previously Presented) The process according to claim 26, wherein said temperature for molding and curing the composition is lower than 180° C.

Claim 39. (Previously Presented) The process according to claim 35, wherein said filler (D) comprises a silica powder, alumina, talc, calcium carbonate, clay, mica or a combination of two or more; the particle size of said filler (D) is no more than 20 μm ; and said filler (D) is present in a quantity from 70 to 95 % by weight based on the whole composition.

Claim 40. (Previously Presented) The process according to claim 39, wherein said silica powder is fused silica.